Test Equipment Depot
1-800-517-8431

FLUKE

Fluke 192/196/199

MS 190 and MA 190

Users Manual Supplement

4822 872 00979
April 2000
© 2000 Fluke Corporation. All rights reserved. Printed in the Netherlands.
All product names are trademarks of their respective companies.

Test Equipment Depot - 800.517.8431 - 99 Washington Street Melrose, MA 02176
FAX 781.665.0780 - TestEquipmentDepot.com

Table of Contents

Test Equipment Depot
1-800-517-8431

Chapter	Title	Page
1	**General**	**1-1**
	About this Manual	1-1
	Safety Information	1-1
	Limited Warranty, Limitation of Liability	1-1
	About the MS 190	1-2
	Factory Installed MS 190	1-2
	MS 190 Package for Field Installation	1-2
	MA 190 Accessory Kit	1-4
2	**Using the MS190 Function**	**2-1**
	mAs Measurements	2-1
	Extended Offset	2-3
	Persistence	2-6
	Smart Average	2-7
	Non Interlaced Video Triggering	2-10

Test Equipment Depot
1-800-517-8431

Chapter 1
General

About this Manual

This manual supplement is an addition to the Users Manual that is included with the ScopeMeter 192/196/199 test tool kit.
It provides user information about the extended test tool functionality that becomes available after installation of the MS 190 software.

Safety Information

Read and comply with the safety instructions that you find in the ScopeMeter 192/196/199 Users Manual that is included in the test tool kit shipment.

The MA 190 kit accessories are intended for low voltage (42 Vpk) use only, and do not comply with the voltage rating on most other ScopeMeter accessories. Carefully read the warning below which is an explicit addition to the general accessory and ScopeMeter safety statements.

⚠ Warning

To avoid electrical shock or fire, do NOT connect the following accessories to voltages more than 42 Vpk (30 Vrms) or circuits of more than 4800 VA :

- **CS 190-1R, 1 Ohm shunt resistor**
- **TR 190-50R, 50 Ohm terminator**
- **TA 190-50R, 50 Ohm terminator / 10:1 attenuator**

Limited Warranty, Limitation of Liability

Read the Warranty and Limitation of Liability statements that you find in the ScopeMeter 192/196/199 Users Manual that is included in the test tool kit shipment. These statements also apply to the MS190 and MA190 kits.

Test Equipment Depot
1-800-517-8431

About the MS 190

The MS 190 software expands the Fluke 190 ScopeMeter software functionality with mAs measurements, non interlaced video triggering, smart averaging, adjustable persistence, and extended offset. To exploit the full potential of the MS 190 software the MA 190 accessory kit is available.

The MS 190 is either factory installed for specific products, or can be field installed in the full series of the 190 series products.

Factory Installed MS 190

If the MS190 has been factory installed, the type plate shows the text “MS 190 Installed”, as shown in the figure below.

The contents of the shipment includes:

- the ScopeMeter Test Tool kit provided with the MS 190 software extension. For the contents of this shipment see the Unpacking instructions in the ScopeMeter 192/196/199 Users Manual.
- User Manual Supplement MS 190 (this booklet)
- The MA 190 Accessory kit.

MS 190 Package for Field Installation

The MS 190 software kit enables a Fluke 192/196/199 ScopeMeter Test Tool to be upgraded with the MS190 software functionality.

The MS 190 package includes:

- CD-ROM to install the MS 190
- User Manual Supplement MS 190 (this booklet)
- Sealed envelope containing registration code and installation instructions

Test Equipment Depot
1-800-517-8431

IMPORTANT NOTES *(field installation only)*

For Servicing it is very important that you attached the registration code sticker on the back of your instrument.

FLUKE MS 190 software extension
Serial Nr.: SN22222222
Reg.code : RC141414141

For later reference write your Registration Code (RC ....., included in the sealed envelope), User Code (UC.... received after registration on the internet), and ScopeMeter serial number (DM..... on the back of your instrument) in the boxes below.

RC	UC	DM

Instructions for field installation

The Registration document included in the sealed envelope provides detailed installation instructions. Prior to installation you must register at our internet site www.Fluke.com/ScopeMeter.

Requirements:

- Fluke 192/196/199 ScopeMeter with software version V03.00 or higher.

Note

Earlier versions of hardware and software can be upgraded by Fluke authorized service centers. The service center will ask a fee and will ask you for the registration number of your MS190 kit. The upgrade includes a full calibration. Ask your service center for a quote.

- PC with Windows 95/98 or NT4.0, CD-ROM drive, RS232 serial port, and Internet access
- Optically insulated serial cable PM9080/001 as included with S versions ScopeMeter. It is also available as separate accessory.

Test Equipment Depot
1-800-517-8431

MA 190 Accessory Kit

The MA 190 is an optional accessory kit that provides optimal connectivity in medical and video applications. Optimal user convenience and application coverage is obtained when the kit is used with a Fluke 192/196/199 that has the MS 190 installed.

Before use carefully read the **WARNING** on page 1-1.

The kit contains:

- TR 190-50R, 50 Ohm BNC feed-through terminator for video and HF measurements (Max. 5 V) . See Fig. 1-1.
- TA 190-50R, 50 Ohm 10:1 attenuator feed-through terminator for additional dynamic range and offset. See Fig. 1-1.
- CS 190-1R, 1 Ohm current shunt for sensitive current and mAs measurements. (Max. 500 mA) . See Fig. 2-1.
- Safety designed 50 Ohm BNC cable with isolated plastic connectors. (1.5 m)
- Female BNC to male 4 mm banana plug adapter
- Two female to female 4 mm banana plug adapters

Note 1

The CS 190-1R, the TR 190-50R, and the TA 190-50R are not available as individual accessory, but only as part of the MA 190 kit.

Note 2

The mAs and extended offset functionality are available only when the MS 190 software is installed.

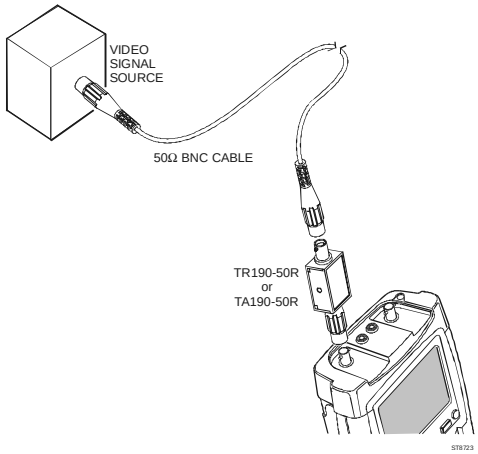


Figure 1-1. 50 Ohm cable termination using the TR190-50R or TA190-50R

Test Equipment Depot
1-800-517-8431

Chapter 2
Using the MS190 Function

mAs Measurements

The MS190 allows you to make mAs (milliampere x seconds) cursors measurements. You can do this on live waveforms, frozen waveforms (HOLD), recorded waveforms, and on saved waveforms.

To perform mAs measurements, do the following:

1	Connect the current shunt CS190-1R to input A using the BNC cable (see Figure 2-1)
2	Connect the current shunt resistor CS 190-1R to the current source using the BNC to banana adapter (see Figure 2-1)

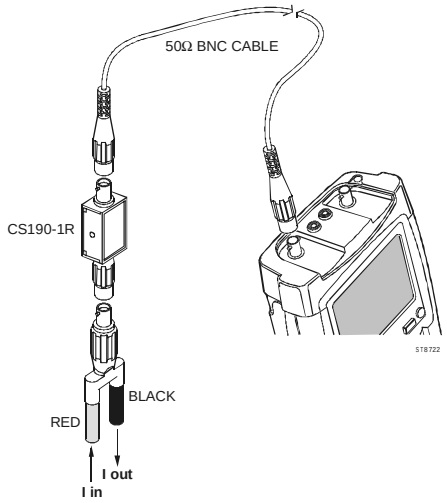
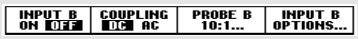
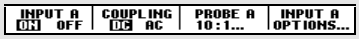
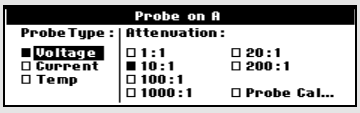


Figure 2-1. mAs measurement

Test Equipment Depot
1-800-517-8431

3	B	Display the **INPUT B** key labels. 
4	F1	Press to highlight **OFF**. Observe that Input B is turned off.

Only in single channel mode key F3 allows the **T 1/T mAs** selection.

5	A	Display the **INPUT A** key labels. 
6	F3	Open the **Probe on A** menu. 
7	F4	Select **Current** with the arrow keys, then press **ENTER** to jump to **Sensitivity**.
8	F4	Select for example **1 V/A** with the arrow keys, then accept.

9	CURSOR	Display the cursor key labels.

When **Voltage** is selected in the **Probe on A** menu, the F3 label shows **mVs** (not **mAs**)

10	F1	Press to highlight ▮▮. Observe that two **vertical** cursors are displayed.
11	F3	Press to highlight mAs.

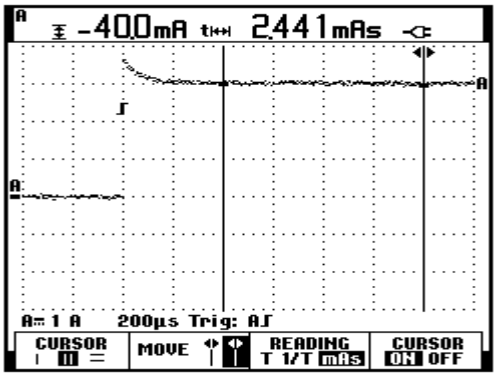


Figure 2-2. mAs measurement screen

Test Equipment Depot
1-800-517-8431

The screen shows :

- Top left reading, **A** (mA, µA, etc.):
  the difference between the current amplitude measured on the left cursor and measured on the right cursor:
- Top right reading, **mAs** (As, µAs, etc.):
  the integrated current over the time between the cursors.

12	F2	Highlight the left cursor.
13		Move the left cursor to the desired position on the waveform.
14	F2	Highlight the right cursor.
15		Move the right cursor to the desired position on the waveform.

Extended Offset

The MS190 extended offset function enlarges the vertical trace positioning range for input A and input B to 16 divisions (maximum). This allows you to zoom-in vertically to study small details of the signal.

To choose the extended offset range for input A do the following:

1	A	Display the **INPUT A** key labels. INPUT A [On] OFF | COUPLING DC AC | PROBE A 10:1... | INPUT A OPTIONS...
2	F4	Open the **INPUT A** menu Input A Polarity: ■Normal □Inverted Bandwidth: ■Full □10 kHz □20 MHz Offset range: ■Normal □Extended
3	F4 (2x)	Jump to **Offset range**.
4	F4	Select **Extended** and accept the extended offset range

Test Equipment Depot
1-800-517-8431

To move the trace::

1		Move the trace up or down until the ground marker hits the top - or bottom grid line.

When moving down, the following banner will show up:

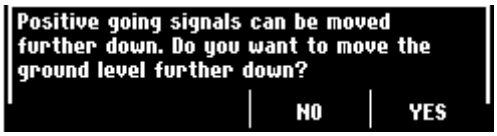


Figure 2-3. Extended offset banner

When moving up a similar banner shows up.

Oscilloscopes and dynamic range

To prevent waveforms from being distorted, in particular signals with large very steep edges, the signal should stay within the dynamic range, just as with any Oscilloscope.

The dynamic range limits are the same as the trace offset limits given in the section Specifications below.

In practice you must take care when using high time base speeds when looking at signals that have large very steep edges. They can be distorted when they jump from outside the dynamic range directly to the visible area of the screen.

Figure 2-4 shows a pulse wave within the dynamic range (left), and a pulse wave that is partially outside the dynamic range (right). The example, particularly the 16 div trace offset, applies to one of the 4 most sensitive ranges.

Test Equipment Depot
1-800-517-8431

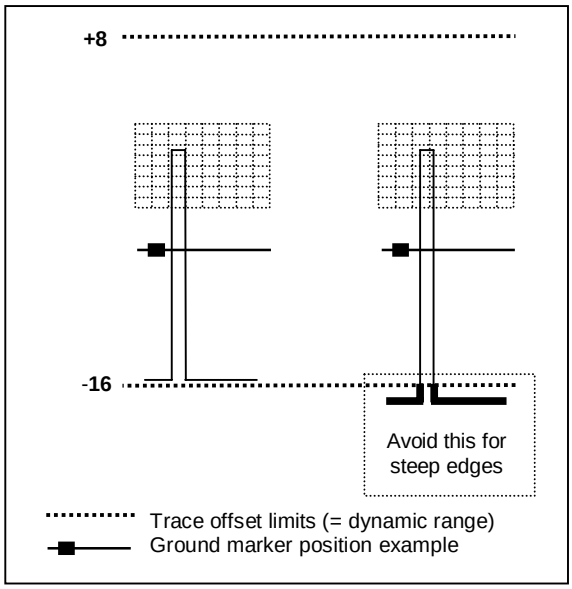


Figure 2-4. Max. trace offset lowest ranges

Triggering

The extended offset range allows you to shift the signal up and down. Be aware that only the "visible" part is sampled by the ADC, and that the trigger level has to stay in the visible area too. Depending on what you are looking for, it might be required to switch to Edge Trigger or to time-qualified Pulse Trigger mode.

Tip for video signal measurements

To gain full profit of the Extended Offset for video signal measurements:

- use the 50 Ω 10:1 attenuator feed-through terminator
- select Probe on A attenuation 10:1
- select range 500 mV/d

Now you can move the trace down for 16 divisions.

Specifications

Maximum trace offset with respect to center screen:

Vertical ranges 5 mV to 50 mV/div (direct 1:1):
positive going signals ..... -16 div
negative going signals ..... +8 div

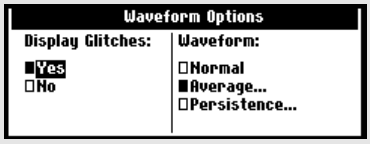
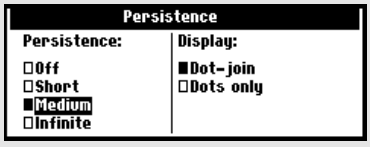
Other vertical ranges:
positive going signals ..... -8 div
negative going signals ..... +8 div

Test Equipment Depot
1-800-517-8431

Persistence

Use persistence to select the display time of the upper and lower boundaries of dynamic waveforms. Use persistence also to display color modulation and color burst shapes.

To select persistence, do the following:

1	SCOPE	Display the **SCOPE** key labels.
2	F4	Open the Waveform Options menu. 
3	F4	Jump to the **Waveform** field.
4	F4	Open the **Persistence** menu 
5	F4	Select one of the persistence options and jump to **Display**
6	F4	Select **Dot-join** or **Dots only**. Accept the selection and close the menu.

Dot join

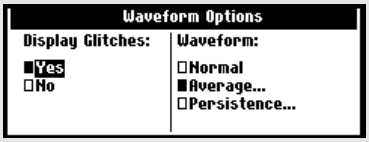
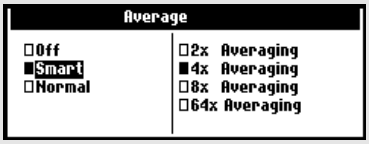
The choice between **Dot-join** or **Dots only** depends on your personal preference for the waveform representation on screen, or in documentation.

Test Equipment Depot
1-800-517-8431

Smart Average

Most users do not like to use averaging as the standard default mode. Occasional deviations in a waveform just distort the averaged waveshape , and do not show up on screen clearly. When a signal really changes, for instance when you probe around, it takes quite some time before the new waveshape is stable. With smart averaging you can quickly probe around, and incidental waveform changes like a line flyback in video show up on screen instantly without distorting the main signal.

To smooth the waveform, do the following:

1	SCOPE	Display the **SCOPE** key labels.
2	F4	Open the Waveform Options menu. 
3	F4	Jump to the **Waveform** field.
4	F4	Open the **Average** menu 
5	F4	Select Smart
6	F4 (2x)	Accept the selection and close the menu.

Test Equipment Depot
1-800-517-8431

Smart average vs. normal average

Normal average smoothes the waveform of repetitive signals. It gives you the averaged waveform over successive acquisitions. A single waveform that deviates strongly will affect the smoothed waveform. This happens for example when looking at an interlaced video system. The fly-back line can distort the waveform, and you will not see it flash by as a separate waveform (See Figure 2-5).

Another characteristic of normal average is that when the signal really changes, for example if you are probing around, it takes some time before the new signal becomes stable. The displayed waveform slowly changes from one waveform to another waveform.

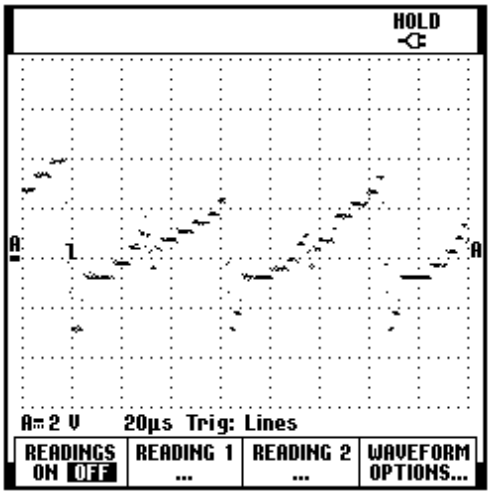


Figure 2-5. Normal Average

Test Equipment Depot
1-800-517-8431

Smart average gives you the primary waveform, but displays an incidental trace of different waveshape directly and without affecting the primary waveform .
You can now for example look at the averaged waveform on an interlaced video system, and still see the fly-back line flash by (See Figure 2-6).

When the signal changes are of more permanent nature, the averaging algorithm automatically restarts and displays the new waveform instantly, without displaying the distorted intermediate waveshapes.

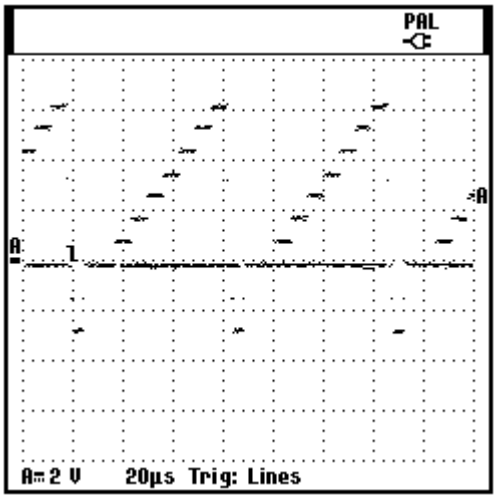


Figure 2-6. Smart Average

Test Equipment Depot
1-800-517-8431

Non Interlaced Video Triggering

To select triggering on a non interlaced video signal, do the following:

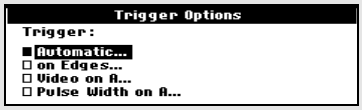
1 Apply a video signal to the red input A.

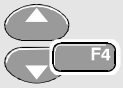
2

Display the **TRIGGER** key labels.

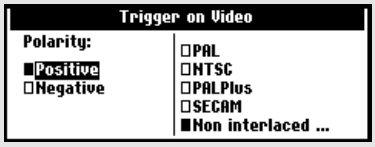
3

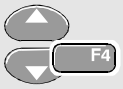
Open the **Trigger Options** menu.



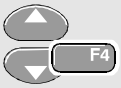
4 

Select **Video on A** to open the **Trigger on Video** menu.

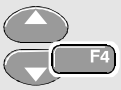


5 

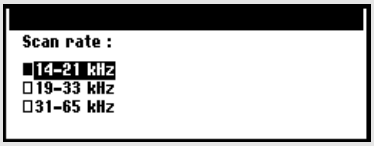
Select positive signal polarity for video signals with negative going sync pulses.

6 

Select **Non interlaced** to open the **Scan rate** menu

7 

Select the required Scan rate and confirm the selection.



Trigger problems

The non-interlaced trigger circuits expect synchronization pulses that comply with standard video, or that are of similar amplitude but with shorter pulsewidth. The circuit however covers most other “standards” too. In case of incidental problems you always can define the trigger conditions in more detail using the time qualified pulse triggering.